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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/650,535	08/28/2003	David C. Yates	IND 053 DIV1/GSG	9035

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EXAMINER	
JAGAN, MIRELLYS	
ART UNIT	**PAPER NUMBER**
2859	

DATE MAILED: 02/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/650,535	YATES ET AL.	
	Examiner	Art Unit	
	Mirellys Jagan	2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 August 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *22-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *22-28 and 30-35* is/are rejected.

7)☒ Claim(s) *29 and 36* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 August 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *7/29/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 22-29 and 36 are objected to because of the following informalities:

In claim 22, it is not clear where the "specified light signals" are obtained from, e.g., are the light signals from the laser diode or from the optical fiber tip?

In claims 29 and 36, it is not clear from the claim language how the integrator component is preloaded 'upon' the determined temperature, i.e., the claims appear to state that the integrator component is somehow combined with the determined temperature. Therefore, claims 29 and 36 have not been further treated on the merits.

Claims 23-28 are objected to for being dependent on objected base claim 22. Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 22 and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,968,036 to Goodman et al [hereinafter Goodman].

Referring to claim 22, Goodman discloses a method of maintaining the temperature of an optical fiber tip (68) of a laser system at a desired (preselected) threshold temperature by:

processing specified light signals to determine a temperature of the tip as a function thereof;

comparing the determined temperature to the desired threshold temperature (i.e., determining if there is an error);

generating a signal that is a function of a difference between the determined and the desired threshold temperature; and

controlling power output to a laser diode (66) of the laser system based on the generated signal (see figure 10; column 5, lines 2-7; column 12, lines 39-41; column 12, line 59-column 13, lines 19; and column 13, lines 36-52).

Referring to claim 30, Goodman discloses a system for maintaining the temperature of an optical fiber tip (68) of a laser system at a desired temperature, the system including a laser diode (66) for providing a laser beam to the tip, comprising:

a processor (78) for determining a temperature of the tip as a function of light signals detected in the system;

a power amplifier for supplying power to the diode; and

a controller (80) for providing a power output signal to the amplifier, and containing an algorithm for calculating the power signal as a function of a signal generated by comparing the determined and desired temperature (i.e., determining an error) (see figure 10; column 5, lines 2-7; column 12, lines 39-41; column 12, line 59-column 13, lines 19; and column 13, lines 36-52).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 23-25, 31, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goodman.

Goodman discloses a method and system having all of the limitations of claims 23-25, 31, and 32, as stated above in paragraph 3, except for the desired temperature being a temperature range (control band) having an upper and a lower threshold limit, and determining whether the determined temperature is within the temperature range (i.e., determining if an error exists); and wherein a maximum power output is provided to the diode when the determined temperature is less than the lower threshold limit and a minimum power output is provided to the diode when the determined temperature is greater than the upper threshold limit.

However, Goodman discloses that the system is used on teeth to ablate different types of materials or layers from the tooth, such as dentin, caries, or enamel, by heating the tooth with the laser system, wherein each type of material has it's own threshold temperature range at which the heat is able to ablate the material. The controller of the system adjusts the laser power in accordance with the type of material being ablated by reducing the power when a temperature is too high (above threshold) and applying power when the temperature is too low (below threshold).

Referring to claims 23, 31, and 32, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method and system of Goodman

by providing the controller with a temperature range (control band) having an upper and a lower threshold limit in order to control ablation of a particular material, and since Goodman teaches that each particular material on which the system is used has a corresponding ablation threshold range.

Furthermore, referring to claims 24, 25, 31, and 32, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method and system of Goodman by providing a maximum power output when the determined temperature is less below threshold and a minimum power output when the determined temperature is above threshold in order to provide an extreme correction of power to more quickly return the temperature within threshold range, and since Goodman teaches that the laser power is controlled by reducing the power when a temperature is too high (above threshold) and applying power when the temperature is too low (below threshold).

6. Claims 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goodman in view of the publication "Principles And Practice Of Automatic Process Control" by Smith et al [hereinafter Smith].

Goodman discloses a method having all of the limitations of claims 26-28, as stated above in paragraph 5, except for the controller being a P-I controller having a proportional component being the product of the difference, i.e., error, signal and a proportional scaling factor, and an integrator component being the product of an integrator scaling factor and the error signals over time.

Smith discloses that it is known to use P-I controllers in control loops, such as feedback loops, and that P-I controllers have a proportional component being the product of an error signal and a proportional scaling factor (K_c), and an integrator component being the product of an integrator scaling factor (K_c/τ_I) and error signals over time, wherein the error is the difference between a controlled variable and the desired set point for the controlled variable, e.g., an error is a difference between a measured temperature and a desired set-point temperature. In a feedback control loop, a P-I controller provides feedback control of the controlled variable by adjusting a process device (manipulated variable) based on a determined error in order to maintain the controlled variable at the set-point (eliminate the error), e.g., a P-I controller will adjust a thermal device to heat or cool the process when an error is determined between the measured temperature and the desired set-point temperature in order to maintain the measured temperature at the set point (eliminate the error). P-I controllers are desirable since they provide automatic control of a controlled process variable while removing an offset (see pages 1-9, 222-223, 225-227, and 231-234).

Referring to claim 26, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method disclosed by Goodman by replacing the controller with a P-I controller, since Smith discloses that P-I controllers are a basic component of feedback control loops known in the art of automatic process control, and are useful for providing automatic control of a controlled process variable, such as temperature, while removing an offset.

7. Claims 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goodman in view of Smith.

Goodman discloses a system having all of the limitations of claims 33-35, as stated above in paragraph 3, except for the desired temperature being a temperature range (control band) having an upper and a lower threshold limit, and determining whether the determined temperature is within the temperature range (i.e., determining if an error exists); and the controller being a P-I controller having a proportional component being the product of the difference, i.e., error, signal and a proportional scaling factor, and an integrator component being the product of an integrator scaling factor and the error signals over time.

However, Goodman discloses that the system is used on teeth to ablate different types of materials or layers from the tooth, such as dentin, caries, or enamel, by heating the tooth with the laser system, wherein each type of material has it's own threshold temperature range at which the heat is able to ablate the material. The controller of the system adjusts the laser power in accordance with the type of material being ablated by reducing the power when a temperature is too high (above threshold) and applying power when the temperature is too low (below threshold).

Smith discloses that it is known to use P-I controllers in control loops, such as feedback loops, and that P-I controllers have a proportional component being the product of an error signal and a proportional scaling factor (K_c), and an integrator component being the product of an integrator scaling factor (K_c/τ_I) and error signals over time, wherein the error is the difference between a controlled variable and the desired set point for the controlled variable, e.g., an error is a difference between a measured temperature and a desired set-point temperature. In a feedback

control loop, a P-I controller provides feedback control of the controlled variable by adjusting a process device (manipulated variable) based on a determined error in order to maintain the controlled variable at the set-point (eliminate the error), e.g., a P-I controller will adjust a thermal device to heat or cool the process when an error is determined between the measured temperature and the desired set-point temperature in order to maintain the measured temperature at the set point (eliminate the error). P-I controllers are desirable since they provide automatic control of a controlled process variable while removing an offset (see pages 1-9, 222-223, 225-227, and 231-234).

Referring to claim 33, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Goodman by providing the controller with a temperature range (control band) having an upper and a lower threshold limit in order to control ablation of a particular material, and since Goodman teaches that each particular material on which the system is used has a corresponding ablation threshold range.

Furthermore, referring to claim 33, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system disclosed by Goodman by replacing the controller with a P-I controller, since Smith discloses that P-I controllers are a basic component of feedback control loops known in the art of automatic process control, and are useful for providing automatic control of a controlled process variable, such as temperature, while removing an offset.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents and publications disclose temperature control of an optic fiber in a laser system:

U.S. Patent 5,928,222 to Kleinerman et al
U.S. Patent 4,695,697 to Kosa
U.S. Patent 6,567,438 to Lin
U.S. Patent 6,775,315 to Nield et al
U.S. Patent 5,684,590 to Sanders et al
U.S. Patent Application Publication 2004/0199151 to Neuberger

The following patent discloses power control in a laser system:

U.S. Patent 6,370,171 to Horn et al
U.S. Patent 4,994,059 to Kosa et al
U.S. Patent 4,932,934 to Dougherty et al
U.S. Patent 5,779,696 to Berry et al

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mirellys Jagan whose telephone number is 571-272-2247. The examiner can normally be reached on Monday-Friday from 11AM to 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on 571-272-2245. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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